DOCUMENT RESUME

ED 129 091 FL 008 027

AUTHOR Dougherty, Janet W. D.
TITLE Error Types and Their Significance in Children's Responses in Elicitation Settings.
PUB DATE May 76
NOTE 36p.; Paper presented at the Conference on Perspectives on Language (Louisville, Kentucky, May 7, 1976)

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS Child Development; *Child Language; Children; Cognitive Tests; *Color; *Error Patterns; Identification Tests; Language Ability; Language Classification; *Language Development; Language Learning Levels; Language Patterns; Language Tests; Maturation; Semantics; Tests; *Vocabulary Development
IDENTIFIERS Elicitation; *Lexico Semantic Development

ABSTRACT

The distribution of errors in children's responses in four elicitation tests of their color-naming abilities is explored with a view to clarifying states of ignorance. Subjects include 47 Polynesian children ranging in age from 2 to 12 years. The four experiments include a naming task, two identification tasks and a mapping task. Children are rank-ordered according to the number of basic color category-color term associations acquired and subdivided into three groups based upon this rank ordering. Their errors are classified as random, admissions of ignorance and other. The distribution of these error types across the groups differs significantly as determined by an analysis of variance. Admissions of ignorance and other errors remain fairly constant across groups while the tendency for random guessing which dominates a child's responses during his early development decreases markedly over time. It is suggested that children's ignorance at the earliest developmental stages can be characterized as "not knowing what one doesn't know." Ignorance is progressively qualified at subsequent stages by an increasing "awareness of what one doesn't know." (Author)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED129091

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Error Types and Their Significance in Children's Responses In Elicitation Settings

Janet Wynne Dixon Dougherty

Department of Anthropology, University of California, Berkeley

Department of Linguistics, Massachusetts Institute of Technology

FL008027

Abstract

The distribution of errors in children's responses in four elicitation tests of their color naming abilities is explored with a view to clarifying states of ignorance. Subjects include 47 Polynesian children ranging in age from 2 to 12 years. The four experiments include a naming task, two identification tasks and a mapping task. Children are rank ordered according to the number of basic color category-color term associations acquired and subdivided into three groups based upon this rank ordering. Their errors are classified as random, admissions of ignorance and other. The distribution of these error types across the groups differs significantly as determined by an analysis of variance ($DF1/DF2 = 4/80$, $F = 25.7138$, $p<0.0001$). Admissions of ignorance and other errors remain fairly constant across groups while the tendency for random guessing which dominates a child's responses during his early development decreases markedly over time. It is suggested that children's ignorance at the earliest developmental stages can be characterized as "not knowing what one doesn't know". Ignorance is progressively qualified at subsequent stages by an increasing "awareness of what one doesn't know".

Four experiments were designed to investigate the child's acquisition of a system for the classification of colors. The focus of the research discussed here is an analysis of the variance in the distribution of children's errors throughout the period of lexico-semantic development.

The four elicitation tasks or experiments were devised to test children's comprehension and production relevant to the adult scheme for classifying colors. It was expected that the variety of experiments would elicit a wide range of error types with sufficient frequency to allow analysis. There were three initial hypotheses. One, that the kinds of errors which would arise most commonly in elicitation tests would be different from those errors most commonly identified in other types of children's speech samples, particularly spontaneous utterances and imitation. Two, that if the first hypothesis were true, an analysis of the distribution of elicited errors would serve as a measure for monitoring lexical-semantic development which would complement studies of semantic development based on spontaneous speech and enhance our understanding of the developmental process. And finally, three, that this approach would provide a means for exploring the structure of a child's ignorance, as well as his increasing knowledge, throughout the

---

This research grew out of a doctoral dissertation entitled "A Universalist Analysis of Variation and Change in Color Semantics". Support for this research was generously contributed by the National Institute of Mental Health. I would like to thank Guy Carden, Barbara Lust, Hermina Sinclair de Zwart, Paul Kay, Brent Berlin, Dan Slobin, Chad McDaniel and Tulio Marañon for their constructive comments and criticism. Special thanks are due to Joe Bauer and Ed Walker for their help in the statistical analyses. Any errors remaining are, of course, my own.

acquisition process. It was expected that co-occuring with regular patterns for acquisition such as the noted progression for lexical items from restricted application through overgeneralization to redefinition approaching an adult model (Dougherty, Note 1; Menyuk, 1971; Stross, Note 2), there would be a pattern or structure to a child's ignorance and this structure would be reflected in a changing distribution of the various types of errors.

Color was chosen as the domain of study for this investigation for two reasons. First, an extensive study of adult classification in the domain of color had already been completed providing a clear standard for evaluating children's responses. Second, standardized stimulus materials were available with an etic grid specifying each color in terms of hue, brightness and saturation which allowed strict specification and control of stimuli. The investigation focused on children's acquisition of a basic system of color classification. For the purposes of this research, and in line with a tradition of studies investigating color nomenclature, a basic color name was defined as a highly salient, monolexemic term which primarily designates a unique color category not included within the limits of any other named color category. In addition, a basic color term, such as the English red, blue or yellow must be applicable to all classes of things appropriately colored (Berlin & Kay, 1969).

The present study of the ontogenesis of a system of color classification and the associated patterning of errors is complemented by a number of investigations of the same phenomena in other languages. Particularly relevant are: Istomina's investigation of color naming among Russian children 2 to 3 years of age (1960); Harkness's investigation of the development of color naming among Guatemalan children speaking either Spanish or Mam (1973); McClure's investiga-

tion of the comparative development of color naming for Spanish-English bilingual children (Note 3); and two studies of the development of color classification among monolingual English speaking American children (Karpf & Lutz, Note 4; Mervis, Catlin & Rosch, 1975).

The present study examines the synchronic variation in the elicited responses of children of different ages with respect to the domain of color. Children's relative development is assessed by the number of basic color category-color term associations acquired. Error frequencies as a percentage of total responses across children constitute the major variables of interest. It is expected that children who know more about the lexical-semantic structure of the domain they are acquiring will make fewer errors in general and fewer random guesses in particular reflecting an increasing understanding that there is a particular systematic lexico-semantic structure to the domain of color which they must acquire.

Subjects

The subjects were 47 children all of whom are native speakers of West Futuna, a Polynesian outlier language spoken on the island of West Futuna in the New Hebrides. This sample included 21 females and 26 males ranging in age from 2 to 12 years[1] and varying according to the extent of their formal education. Primary education had recently been mandated by the British-French condominium government with the result that West Futuna children in this age range may have had from zero to 6 years of formal schooling.

A preliminary review of children's overall performance allowed them to be rank ordered on the basis of relative development. This initial rank order was subsequently modified, however, children are identified throughout this report by the number initially assigned to them (numbers 51 - 97).[2]

Insert Table 1 about here

Table 1, page 5, lists children as initially numbered with their age, sex and formal education. The youngest four children (numbers 94, 95, 96, 97), age 2 and 3, are excluded from the table. They are not included in the following discussion because of the difficulties encountered in trying to elicit data from them.

Children were selected to form a sample as representative as possible of the two major villages on the island with particular attention to reflecting actual variation in formal education. Children of both sexes and all ages from 2 to 12 were included in the sample. An attempt was made to distribute children of each sex across all age levels as evenly as possible. In general testing took place completely outside the school environment, however, in some cases children were taken out of class in order to participate. No payments or promises were made, but each child was thanked earnestly for his help in the project.

Experiment 1

Forty objects were selected from field equipment and the natural environment as stimuli for the initial naming task. The objects included items which represented good examples of each of eleven basic color categories which had been shown to compose the major set of universally recognized color categories (Berlin & Kay, 1969). These consist of: WHITE, BLACK, RED, YELLOW, GREEN, BLUE, BROWN, PURPLE, ORANGE, PINK and GREY. The stimuli also included a series of objects of non-focal, internominal or poorly saturated color.

This first experiment was administered by selecting an object at random

presenting it to a child and asking, "a fei fakua tenei?" "How is this one?"[3] When the child responded, the response was recorded and the procedure repeated with another randomly selected object until each of the original 40 objects had been presented to the child once.

This procedure was altered for pre-school children if they demonstrated difficulty with the task. In these cases, two color terms were offered to the child who was then asked to indicate which of the two was appropriate to a particular stimulus being presented to them. For example, a young child presented with an object would be asked, "a fei fakua tenei? e hkego mo e uri?" "How is this one? Is it white or is it black?" Normally, one of the suggested color terms was appropriate by adult standars to the stimulus being presented; however, occasionally two inappropriate terms would be offered.

In addition to modifying the elicitation frame for younger children, the number of stimuli presented was often reduced in accordance with a child's frustration, attention span or interest.

Experiment 2

Experiment 2 required that each child select an object from the standard set of 40 items just described for task 1 that best represented a given color term. A standard list of color terms obtained from adults in similar elicitation tests was initially used as the basic stimuli. As the testing progressed, this initial list was augmented with new terms elicited consistently from a number of children. The complete list of non-idiosyncratic terms used as stimuli is given in Table 2, page 8. This set was supplemented for each child with the idiosyncratic terms elicited from him during Experiment 1.

The basic elicitation frame used in Experiment 2 was, "Where is a good X?" or "Which one is a good example of X?" For instance, a child would be seated

with all 40 objects in view and asked, "ta hkego rufie tehe?" "Which one is a good white?" If a child's response was questionable, particularly if it was uncertain whether a correct response was intentional or the result of a random guess, he was asked to make a second and sometimes a third selection for the same color term either immediately following his first choice or later in the task.

The testing procedure was revised for the younger children when necessary. In these cases, the objects from which they were asked to choose a match to a specific color term were limited to two, one of which was generally appropriate to the color term given. So for example, the experimenter would select two objects from the larger group and ask a child, "ta hkego tehe?" "Which one is white?"

Insert Table 2 about here

Experiment 3

Experiment 3 was a mapping task. Each child was required to designate the focus or best example of each named color category on a standard array and subsequently to indicate the boundaries or extension of each category on the same array. The stimulus array used in this task was originally developed by Lenneberg and Roberts (1956) working with the Munsell Color Company and was subsequently revised by Berlin and Kay (1969) and again by Berlin and Berlin (1975). The layout of the array forms the grid of Figure 1. The array is composed of a series of colored chips which vary in hue, brightness and saturation. The chips are arranged in a rectangular block on a heavy neutral grey board. Three hundred and twenty chips are arranged to vary across the horizontal dimension in 40 approximately equal perceptual hue differences

spanning the visual spectrum from red (700 nm) through blue (400 nm) and purple. On the vertical dimension these chips vary in eight degrees of brightness from lightest at the top to darkest at the bottom. Forty white chips border the array on its bright edge and forty black chips border the array on its dark edge. At one side of the array, set off from the main rectangle, is a set of ten achromatic chips arranged vertically from black to white. The intermediate neutral chips represent greys. Chips in the achromatic series have the lowest possible saturation. In the chromatic rectangle, each chip represents the most saturated extension possible for its particular hue and brightness combination. The chromatic rectangle, therefore, reflects the exterior of the color solid.

The procedure for administering Experiment 3 was as follows. The color array was placed before a subject and covered with a thin, transparent sheet of plastic. The subject was then given a black marking pen and directed to put an X in the chip or chips that represented the best examples of a particular named color category. "nageifo tasi a ekis i ta nea numba won, ta hmea rufie, ta hmea rufie faka rufie, ta hmea mafi." "Put down one X in the number one thing, the good red, the best red, the very red." Using a piece of cardboard the experimenter would make an X demonstrating what was desired. In this task young children often indicated their best example judgements simply by pointing.

After locating the focal region for a particular named color category, each subject was asked to outline its maximum range. The experimenter would direct the subject as follows: "pena tasi a koupa i a nea oji hmea. pena ta koupa fei pe ta koupa pakasi mo ta pae. pe akoe nou tukua e hmea, kou pena wai ta koro, kaie pe se hmea ma koina wai tafa. a hmea oji wai ta koro kaie a nea mo a kala keke wai tafa." "Make a fence around everything RED. Make a fence

like a pig pen or a rock enclosure. If you call something RED then enclose it within, but if it's not RED then leave it outside. All the RED's inside and all the different things or colors outside." The verbal instructions were supplemented by drawing an enclosed shape on a sheet of cardboard to illustrate generally what was being requested. Individual color categories were mapped on separate sheets of plastic whenever possible to insure that a child's responses would not be directly effected by his prior judgements. In some cases, color categories well separated on the array were mapped on a single sheet of plastic. Mapping responses were coded at the end of each testing period on individual coding sheets which represented the array.

Insert Figure 1 about here

Experiment 4

The final task, Experiment 4, was a naming task. Each child was required to name examples of the foci of eleven basic color categories and one non-focal color in the yellow-green region of the array. The eleven category foci to be named were best examples of WHITE, BLACK, RED, YELLOW, GREEN, BLUE, BROWN, PINK, PURPLE, ORANGE and GREY. The particular focal chips selected for this experiment were determined from the aggregate data compiled from the responses of West Futuna adults in combination with the focal choices made by 20 speakers of 20 different languages investigated by Berlin and Kay (1969). Focal choices made by the Dugum Dani of New Guinea (Heider, 1972) and the Aguaruna Jivaro of Peru (Berlin and Berlin, 1975) were added to this pool.

To administer this task the experimenter indicated one of the twelve preselected areas of the array as shown in Figure 1, and asked, "a fei fakua tenei? teha tano eigoa?" "How is this one? What is its name?"

Results

The results of the children's performance on all four tasks are summarized in Table 3, page 13. Children are rank ordered in Table 3 according to the number of basic color category-color term associations they had acquired. To be credited with acquisition of a particular color category and its associated color term a child must have had 100% correct responses throughout all four experiments for that particular association. Correctness was judged on the basis of the West Futuna adult model as determined from a prior set of similar experiments involving 50 adult subjects (Dougherty, 1975, in press). Categories and terms which were consistently used by children and which were in excess of the normal adult inventory were evaluated on the basis of saliency, as determined from consistency of use and stability of reference, and the relation of the semantic category and its name to other color categories and their associated labels.

A comparison of Table 1 (page 5) and Table 3 suggests that expansion of a child's inventory of acquired category-term associations is correlated with both age and schooling. The Pearson r correlation between number of acquired category-term associations and age of subject (as estimated by the experimenter) is .81. The same correlation with subjects' years of formal schooling is .72.

Table 3 itself suggests that the observed lexico-semantic development follows a regular acquisitional sequence illustrated in Figure 2. This sequence implies that those children who share the same number of acquired category-term associations also tend to share the same particular associations.[4]

Insert Figure 2 about here

Insert Table 3 about here

On the basis of this final developmental rank ordering, the children were divided into three groups. Group 1 is composed of the 13 children who demonstrated acquisition of from 0 to 3 category-term associations. Group 2 contains the 19 children who had acquired 4, 5 or 6 such associations. Group 3 contains 11 children all of whom demonstrated acquisition of 7, 8 or 9 category-term associations.

A review of the children's responses suggested a tripartite classification of errors into a) random errors, b) admissions of ignorance, and c) other errors. Random errors include associations of any color term with an inappropriate stimulus (again as judged by adult standards) where no regular patterning to the association is evident from the child's total responses. For instance, if a child uses the color term for red in reference to yellow-green and purplish hues and names red hues with other color terms these errors would be included within the class of random errors. Admissions of ignorance include responses such as "avau e pupusi" "I don't know", "avau tamtafu" "I'm just a man from the bush", shrugging the shoulders and similar indications that a child can not respond in a particular situation. Other errors include two distinct types of responses. Any responses indicating a noncolorometric feature of a stimulus are included in other errors. In addition, a child's errors which are consistently patterned throughout all four experiments are counted in the class of other errors. This later group includes errors such as one child's consistent and exclusive reference to grey hues with the loan pigk "pink", as well as the consistent reference to both red and yellow hues by a number of children with the adult term normally restricted to reds alone. Other errors will not be considered further in this discussion.

Insert Table 4 about here

Insert Figure 3 about here

Errors are totaled for each group and reported in Table 4 as a mean percentage of total responses. The mean frequency of each of the three error types as a percentage of total responses for each group is also given in Table 4. Figure 3 graphs the information in Table 4 illustrating clearly a decrease in total error frequencies and in particular a decrease in random error frequencies across groups. An analysis of variance for uneven N, as shown in Table 5, indicates that the differences in the distribution of error types from group to group are significant at the level of $p<0.0001$.

Insert Table 5 about here

Discussion

It was initially hypothesized that the kinds of errors which would arise in elicitation settings would be distinct from those error types most commonly identified in other kinds of children's speech samples, particularly imitation and spontaneous utterances. This hypothesis is supported by the results. The most common types of errors found in the children's elicited responses were random associations of lexical items and semantic categories, and admissions of ignorance, that is, "I don't know" errors. Such errors are only rarely observed in spontaneous speech samples or imitation (Bloom, 1970; Brown, 1973). It seems that contexts in which these same classes of errors might arise in

spontaneous speech or imitation are rare (Bloom, 1970; Brown, Cazden & Bellugi, 1969; Menyuk, 1971; Stross, Note 2; Talmy, Note 5). The "forced choice" element in elicitation settings leads children to respond verbally in situations where they would not otherwise spontaneously volunteer verbal comment. It is only in responses to elicitation tests that random errors and admissions of ignorance surface in children's speech with sufficient frequency to permit analysis.

This leads us to the second hypothesis that an analysis of errors identified in elicited responses could serve as a measure for monitoring lexical-semantic development. This has been substantiated by showing that elicitation settings provide a distinct class of errors which can be traced throughout periods of lexical-semantic development with a view to understanding the child's changing orientation toward or ignorance of the domain concerned. The suggestion embedded in the second hypothesis that these errors might lend themselves to analyses which would complement studies based upon other types of children's speech samples is formally supported by the evidence for a distinct class of errors, amenable to analysis, which arise in elicitation settings.

The third hypothesis proposes that we should expect a pattern or structure to a child's ignorance which would be characterizable as are regular developmental progressions and which would be reflected in a changing distribution of the various types of errors (particularly random responses and admissions of ignorance) found in elicited responses. The results show that increasing development is naturally correlated with a decreasing frequency of errors in general. As children learn more about a particular domain they make fewer errors of classification or naming with respect to that domain. More interestingly, lexico-semantic development, within the domain of color at least, appears to

be correlated with a decreasing frequency for random errors in particular while admissions of ignorance and other errors remain fairly constant throughout the developmental period. This distribution of errors implies a regular developmental progression of the child's orientation toward or ignorance of the domain for which he must acquire a system of lexico-semantic associations from "not knowing what he doesn't know" to "knowing what he doesn't know".

In the earliest developmental period, West Futuna children learned a repertoire of color names without being able to attach these names in any consistent fashion to color categories.[6] The subjects with the fewest acquired category-term associations (group 1) responded randomly throughout all four tasks with the majority of the color terms with which they were familiar. They offered randomly selected terms from their color term inventories for most stimuli with which they were unfamiliar. For example, the color term repertoire of subject number 93, age 3, included the terms hmea "RED" and plu "BLUE" both of which were used in reference to yellow or green hues, while red and blue hues elicited various other color terms in random fashion. Subject number 92, age 4, was familiar with at least 11 distinct color names, although she used none of these consistently in reference to any specific region of the visual spectrum. She used plu "BLUE" to label blue, brown, purple, red and light green hues, and referred to blue hues with the color terms plu "BLUE", wait "WHITE", yela "YELLOW" and hmea "RED". In contrast, these same children (group 1) only infrequently indicated directly by admitting ignorance that they did not know an appropriate term for a particular stimulus.

It appears that although the domain of "color" is isolated as a distinct domain relatively early,[7] internal structuring of the domain proceeds more slowly. While a number of lexical items are acquired early and are correctly

assigned to the domain of color, the process of associating these lexemes with specific color categories occurs over the following five years.[8] The high frequency of random errors in children's early responses and the corresponding failure to admit ignorance suggest that these children are not fully aware that there is a particular system of organization internal to the domain of color which they must acquire. When asked to name colors they volunteer terms seen as gererally appropriate to the domain without regard for more particular category-term associations.

In contrast to this first group of children, those who had acquired seven to nine category-term associations (group 3) and who demonstrated relatively stable systems of color classification did not consistently apply color terms in a random fashion. These children preferred to admit ignorance of any specific association of a particular stimulus and a color term rather than offer an inappropriate, random association as indicated by the significantly greater frequency of admissions of ignorance than of random naming errors, the latter of which approaches zero. There were few stimuli to which these children did not respond appropriately. Where they did have difficulty classifying a stimulus they generally resorted to comparing it to some more familiar and similarly colored item such as a particular flower or characteristic fur coloring of some animal species. These responses were classed as secondary color term responses (Berlin & Kay, 1969; Dougherty, 1975). They were neither random nor admissions of ignorance and were not tallied as errors. It was only when a child of this third group had no basic or secondary category-term association available that he would "err", and his "error" was generally to admit ignorance. Familiar color terms were not misused by the children in group 3 but were applied consistently in appropriate contexts. Where a

child was ignorant of an appropriate classification he seemed to be aware of this as indicated by the tendency to admit ignorance and not to guess randomly.

The intermediate group of children (group 2) who demonstrated acquisition of from four to six basic category-term associations illustrate the transition from early to final stages in lexico-semantic development as these have just been described. These children used the color terms of their stable color category-term associations appropriately. With the partial structure they have acquired, they seem to expect that the unclassified areas of the domain should be similarly structured. It is suggested that the incidence of admissions of ignorance increased for these children relative to group 1 as they became aware of the likelihood that there were particular associations of which they were ignorant. The incidence of random errors decreased from group 1 to group 2 as the latter children acquired progressively more basic category-term associations. However, their color term repertoires still included a number of terms for which they had not acquired a stable color referent. These terms, often recently learned, were applied randomly to regions of the color spectrum which remained unclassified for the children at intermediate stages of development.

In the face of an unclassifiable stimulus a child's tendency to respond randomly appears to decrease as a function of his progress toward mastering the full set of category-term associations of his language. The child's tendency to admit ignorance in the same situations peaks during intermediate stages of acquisition reflecting an increasing awareness of the structure to be acquired without comparable lexico-semantic development. Once the color system has become stable the incidence of both types of error decreases markedly.

At this time the child can appropriately associate the color terms of his language with their color referents. He does not need to respond randomly to stimuli because he can correctly classify the vast majority of them and for the same reason he need not admit ignorance.

In summary, random naming errors and admissions of ignorance do not merely indicate a lack of specific knowledge on a respondent's part. The frequency with which such errors are observed to occur indicates relative development with regard to a given domain. A relatively high frequency of admissions of ignorance in a child's responses indicates that he has become aware that a structure specific to the domain concerned exists although he has not yet acquired the complete structure itself. He is aware that his familiar vocabulary does not apply appropriately in specific instances and assumes that there are appropriate associations of which he is ignorant. In contrast, random naming errors indicate an earlier period of development. The child is not fully aware of his ignorance. He may not be aware that a particular structure is used consistently by adults in the categorization of a given domain. At the earliest stages he may not recognize the domain itself as a unified class. Where randomness is a significant feature of a child's responses (whether this pertains to a complete domain or portion thereof) category development and the association of lexical items with specific semantic categories are at the most rudimentary level.

Reference Notes

1. Dougherty, J. W. D. On the Acquisition of Ethnobotanical Nomenclature. Unpublished manuscript, University of California, Berkeley, 1971.

2. Stross, B. Tzeltal: Acquisition and Componentiality. Paper presented to the Mayan Linguistics Symposium, Sixth Regional Meeting of the Chicago Linguistics Society, Chicago, Illinois, 1970.

3. McClure, E. The Acquisition and Use of Spanish and English Color Terms among Mexican American Children. Paper presented to the 73rd Annual Meeting of the American Anthropological Association, Mexico City, Mexico, 1974.

4. Karpf, J. & Lutz, N. Basic Color Term Acquisition. Paper presented to the Kroeber Anthropological Society Meetings, Berkeley, California, 1975.

5. Talmy, L. Samoan Acquisition and Componentiality. Unpublished manuscript, University of California, Berkeley, 1970.

References

Berlin, B. & Berlin, E. A. Aguaruna color categories. American Ethnologist, 1975, 2(1), 61-87.

Berlin, I., Breedlove, D. E. & Raven, P. H. Covert categories and folk taxonomies. American Anthropologist, 1968, 70, 290-299.

Berlin, B. & Kay, P. Basic color terms: their universality and evolution. Berkeley: Academic Press, 1969.

Bloom, L. Language development: form and function in emerging grammars. Cambridge, Massachusetts: The M.I.T. Press, 1970.

Brown, R. A first language. Cambridge, Massachusetts: Harvard University Press, 1973.

Brown, R., Cazden, C. B. & Bellugi, U. The child's grammar from I to III. In J. P. Hill (Ed.), Minnesota symposium on child psychology. Minneapolis: University of Minnesota Press, 1969.

Dougherty, J. W. D. A universalist analysis of color semantics. Doctoral dissertation, University of California, Berkeley, 1973.

Dougherty, J. W. D. Color categorization in West Futuna: variability and change. In B. Stross & M. Sanchez (Eds.), Sociolinguistic variation. New York: Academic Press, in press.

Harkness, S. The learning of color codes in two cultures. Ethos, 1973, 1(2), 175-200.

Heider, E. R. Probabilities, sampling and ethnographic method: the case of Dani colour names. Man, 1972, 7, 448-466.

Istomina, Z. M. Perception and naming of color in early childhood. Izvestiia Akademii Pedagogicheskikh Nauk, RSFSR number 113, 1960.

Lenneberg, E. H. & Roberts, J. M. The language of experience: a study in methodology. Memoirs of the International Journal of Linguistics, 1956, number 13.

Menyuk, P. The acquisition and development of language. Englewood Cliffs, New Jersey: Prentiss Hall, Inc., 1971.

Mervis, C. B., Catlin, J. & Rosch, E. Development of the structure of color categories. Developmental Psychology, 1975, 11, 54-60.

Footnotes

Children's ages were estimated by the experimenter on the basis of relative physical maturity, years of primary education and age rankings of children by both adults and children in the community.[1]

Subjects numbered 1 through 50 are West Futuna adults who participated in a similar series of experiments not reported here.[2]

This question does not specify color explicitly as the domain of inquiry. There is no generic term for color in West Futuna. Children were set to attend to color during a preliminary interview in which each child was asked to help the experimenter learn the names of the ways objects looked; their appearances, particularly markings, patterns and colors all of which are suggested by the indigenous term hkanuhkanu. During the testing it was discovered that many children were also familiar with the loan kala from the English color. kala was subsequently used in conjunction with hkanuhkanu in the preliminary interview to set the children to the appropriate domain of inquiry.[3]

This ontogenetic sequence reflects the phylogenetic sequence hypothesized by Berlin and Kay (1969) to describe the general evolution of systems for the classification of color.[4]

When children initially admitted ignorance in a particular situation they would be encouraged by the experimenter to try to resond. In most cases they stuck with their initial admission of ignorance. If they subsequently responded appropriately they were credited with a correct response and not with an error. If they subsequently offered a random guess, they were credited with both a random error and an admission of ignorance. Note that the opposite tendency held if children had just made a random response and were pressed to

respond again to help the experimenter understand. In this case the children freely made another random guess.[5]

Both McClure's (Note 3) study of Spanish-English bilingual children and Istomina's (1960) study of 2 and 3 year old Russian children corroborate this finding.[6]

Children 2 and 3 years of age used color terms in their speech but did not consistently differentiate them from other terms referring to other attributes or even names of things. Their responses in the color testing situation included terms normally used to indicate size, shape, texture and kind of thing in addition to color terms. At about 3 years of age the children appear to begin to distinguish color terms from terms indicating non-colorometric attributes of things and names of things. Although they could not consistently assign any given color term to its appropriate color referent nor consistently assign any given color term to a particular region of the visual spectrum, they could, by 4 or 5 years of age, consistently distinguish color terms as members of a single lexical domain concerned with colors. This relatively early development of a concept of "color" in a language lacking a generic term for "color" supports the establishment of covert categories in folk classifications (Berlin, Breedlove & Raven, 1968).[7]

Color is not a highly salient domain for the people of West Futuna and development takes place relatively slowly. In contrast, American children for whom color is a highly salient feature of the environment may complete the acquisition of basic category-term associations in this domain by 3 or 4 years of age (Karpf & Lutz, Note 4).[8]

Table 1

Age, Sex and Education of Subjects

Children as initially numbered	Sex	Age	Years of schooling	Children as initially numbered	Sex	Age	Years of schooling
51	f	10	3	73	m	6	1
52	f	10	3	74	f	9	3
53	f	11	5	75	m	9	2
54	f	9	4	76	m	7	2
55	m	12	5	77	m	7	1
56	m	12	5	78	f	9	4
57	f	12	4	79	m	8	2
58	m	11	5	80	m	8	2
59	f	9	3	81	f	7	2
60	f	9	2	82	f	8	2
61	m	12	4	83	m	7	2
62	m	8	3	84	m	5	1
63	f	12	6	85	f	6	2
64	f	10	3	86	m	10	3
65	m	9	2	87	f	4	none
66	m	9	4	88	f	4	none
67	m	6	1	89	m	5	1
68	m	10	4	90	m	4	none
69	m	8	2	91	f	4	none
70	f	7	2	92	f	4	none
71	f	5	none	93	m	3	none
72	f	7	2				

Table 2

Standard Color Terms Used as Stimuli in Experiment 2

Widely shared color terms elicited from adults		Color terms elicited commonly from children	
West Futuna term	Color referent	West Futuna term	Color referent
hkegoa	"WHITE, LIGHT"	praon	"BROWN"
uri	"BLACK, DARK"	eret	"RED"
hmea	"RED and YELLOW, or RED"	plak	"BLACK"
		wait	"WHITE"
wiwi	"GREEN and BLUE, or GREEN or BLUE"	aranc	"ORANGE"
		vaiolet	"PURPLE"
hkosi	"DESATURATED"		
yela	"YELLOW"		
plu	"BLUE"		
krin	"GREEN"		
rounemahmata	"leaf GREEN"		
hleu	"RED or YELLOW as ripe fruit"		
tai	"BLUE like the sea"		
sekafika	"Malay apple flower PINK"		
sekaumkufatu	"Strachtarpheta flower BLUE-PURPLE"		
hkanuhkanu	"multi-colored"		

[a]The International Phonetic Alphabet is used in transcribing West Futuna with the exception that ŋ is used here to designate the velar nasal ŋ.

Table 3

Summary of Children's Acquired Color Category-Term Associations

Subjects	Acquired Color Category-Term Associations									
	Black	White	Red	Yellow	Green	Blue	Brown	Purple	Orange	Total
51	x	x	x	x	x	x	x	x	x	9
52	x	x	x	x	x	x	x	x		8
53	x	x	x	x	x	x	x			7
55	x	x	x	x	x	x	x			7
56	x	x	x	x	x	x	x			7
57	x	x	x	x	x	x	x			7
58	x	x	x	x	x	x	x			7
59	x	x	x	x	x	x	x			7
61	x	x	x	x	x	x	x			7
62	x	x	x	x	x	x	x			7
63	x	x	x	x	x	x	x			7
54	x	x	x	x	x	x				6
64	x	x	x	x	x	x				6
65	x	x	x	x	x	x				6
66	x	x	x	x	x	x				6
67	x	x	x	x	x	x				6
68	x	x	x	x	x	x				6
69	x	x	x	x	x	x				6
70	x	x	x	x	x	x				6
81	x	x	x	x	x	x				6
71	x	x	x	x	x	x				6
72	x	x	x		x	x	x			6
60	x	x	x		x	x	x			6
73	x	x	x	x			x			5
74	x	x	x		x	x				5
77	x	x	x	x		x				5
75	x	x	x	x						4
76	x	x	x		x					4
79	x	x	x		x					4
80	x	x			x	x				4
78	x	x	x							3
82	x	x	x							3
83	x	x								2
84	x									1
87	x									1
85										0
86										0
88 - 93										0

Table 3

Summary of Children's Acquired Color Category-Term Associations

Subjects	Acquired Color Category-Term Associations									
	Black	White	Red	Yellow	Green	Blue	Brown	Purple	Orange	Total
51	x	x	x	x	x	x	x	x	x	9
52	x	x	x	x	x	x	x	x		8
53	x	x	x	x	x	x	x			7
55	x	x	x	x	x	x	x			7
56	x	x	x	x	x	x	x			7
57	x	x	x	x	x	x	x			7
58	x	x	x	x	x	x	x			7
59	x	x	x	x	x	x	x			7
61	x	x	x	x	x	x	x			7
62	x	x	x	x	x	x	x			7
63	x	x	x	x	x	x	x			7
54	x	x	x	x	x	x				6
64	x	x	x	x	x	x				6
65	x	x	x	x	x	x				6
66	x	x	x	x	x	x				6
67	x	x	x	x	x	x				6
68	x	x	x	x	x	x				6
69	x	x	x	x	x	x				6
70	x	x	x	x	x	x				6
81	x	x	x	x	x	x				6
71	x	x	x	x	x	x				6
72	x	x	x		x	x	x			6
60	x	x	x		x		x			6
73	x	x	x	x			x			5
74	x	x	x		x	x				5
77	x	x	x	x		x				5
75	x	x	x	x						4
76	x	x	x		x					4
79	x	x	x		x					4
80	x	x			x	x				4
78	x	x	x							3
82	x	x	x							3
83	x	x								2
84	x									1
87	x									1
85										0
86										0
88 - 93										0

Table 4

Group Mean Error Frequencies as Percents of Total Response

Children as grouped by number of

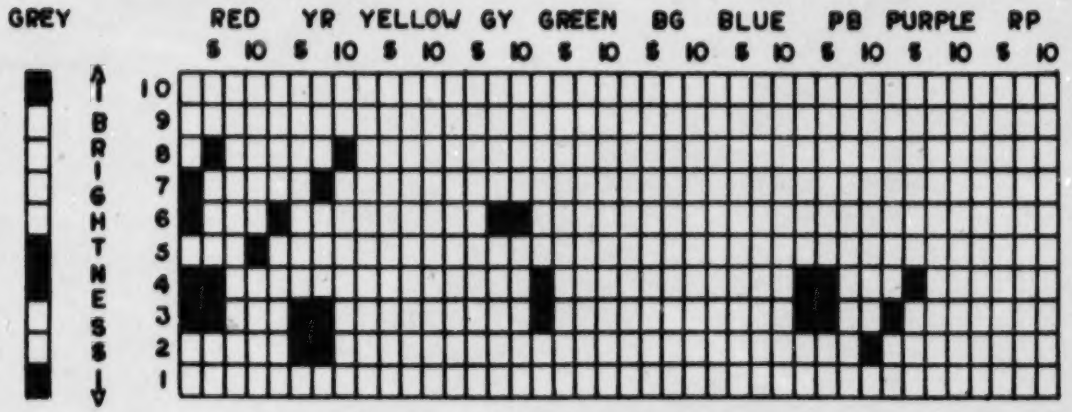
Error types	color category-color term associations acquired		
	Group 1 (n=13)	Group 2 (n=19)	Group 3 (n=11)
Random	51.4%	5.6%	0.7%
Don't know	7.8%	10.6%	5.8%
Other	4.3%	3.9%	1.0%
Total	63.5%	20.1%	7.5%

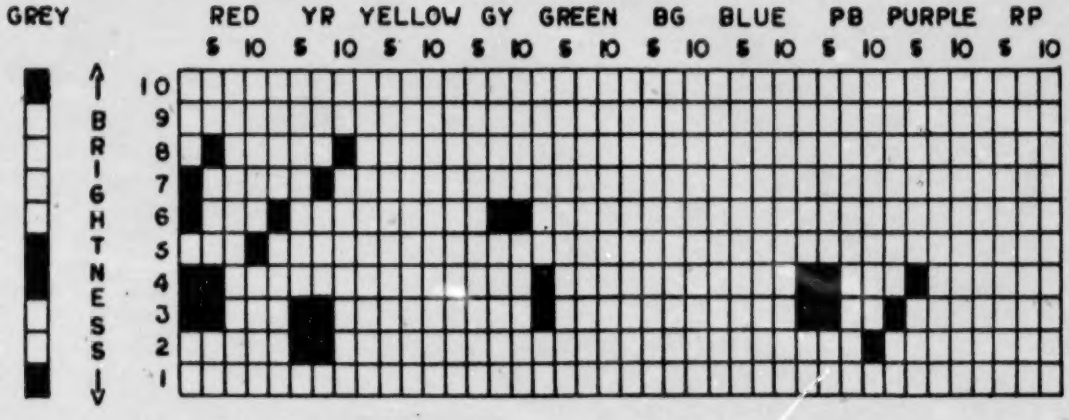
Table 5

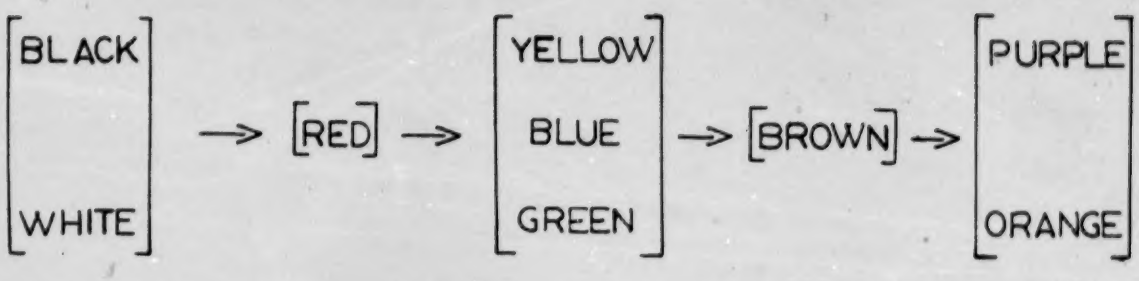
Analysis of Variance for

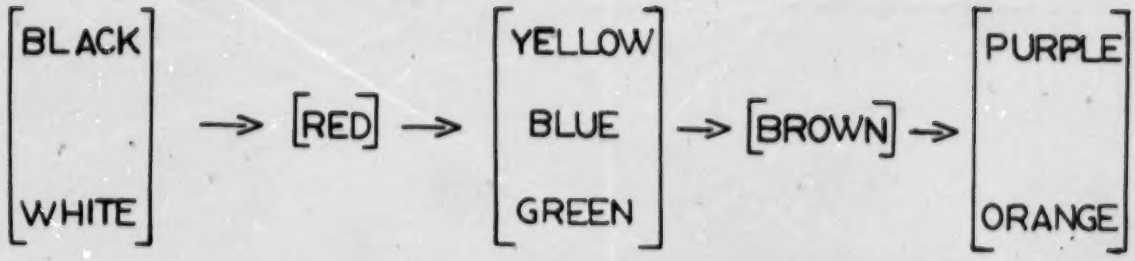
the Distribution of Error Frequencies across Groups

Source	DF 1 / DF 2	F	P Value	Mean square
Subject group x Error type	4 / 80	25.7138	$p<0.0001$	0.405


GREY
RED
YR
YELLOW
GY
GREEN
BG
BLUE
PB
PURPLE
RP
5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10
BRIGHTNESS
10
9
8
7
6
5
4
3
2
1


GREY
RED
YR
YELLOW
GY
GREEN
BG
BLUE
PB
PURPLE
RP
5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10
BRIGHTNESS
10
9
8
7
6
5
4
3
2
1


BLACK
WHITE
RED
YELLOW
BLUE
GREEN
BROWN
PURPLE
ORANGE


BLACK
WHITE
RED
YELLOW
BLUE
GREEN
BROWN
PURPLE
ORANGE

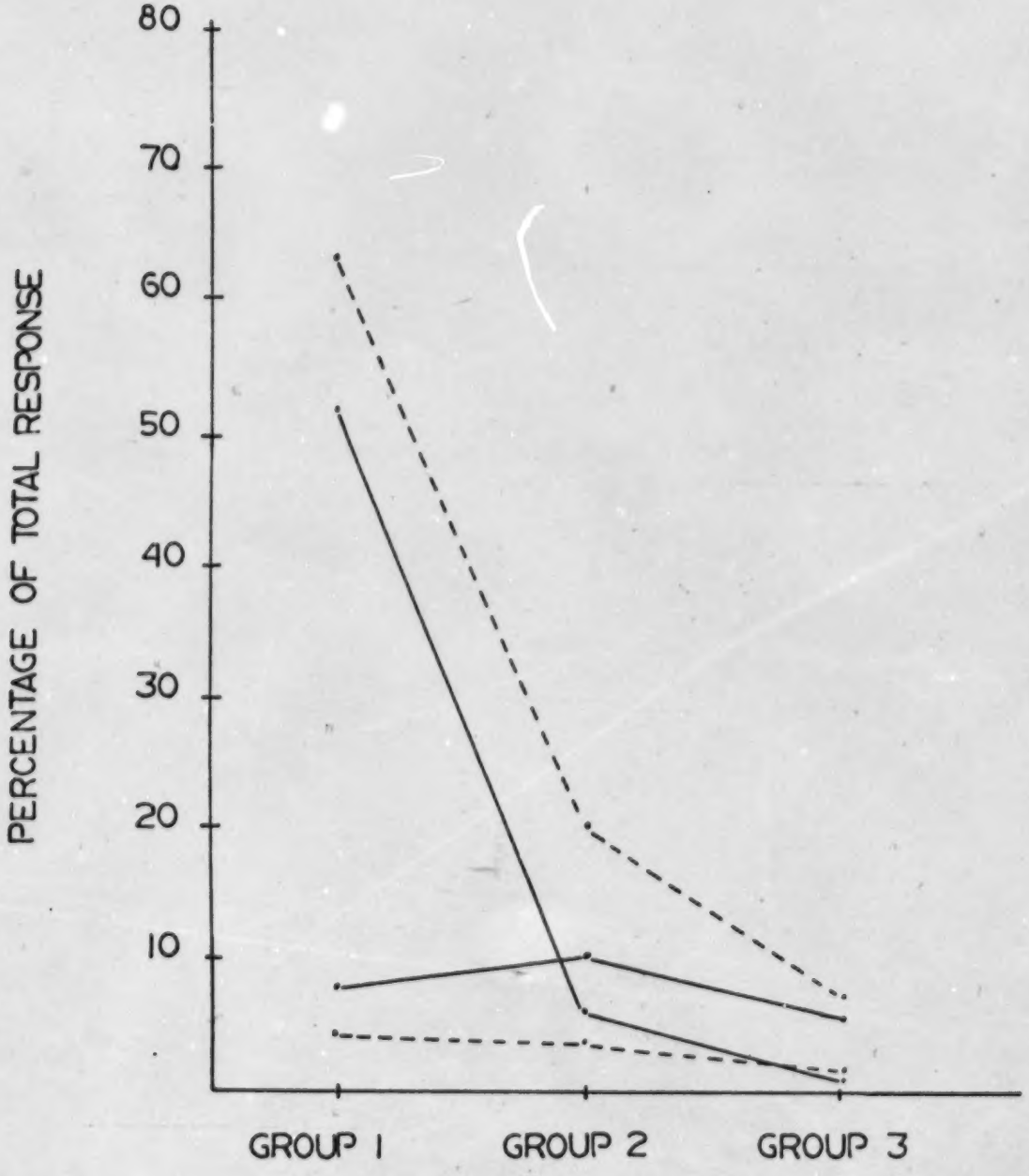

80
70
60
50
40
30
20
10
PERCENTAGE OF TOTAL RESPONSE
GROUP 1
GROUP 2
GROUP 3

Figure Captions

Figure 1. Standard Munsell color array. Each contiguous set of blackened chips represents one of the twelve preselected regions to be named by children in Experiment 4.

Figure 2. Sequence for the acquisition of color category-color term associations by West Futuna children. (The associations for WHITE and BLACK were acquired earliest followed, with one exception, by RED. YELLOW, GREEN and BLUE were acquired in any order relative to one another but generally appeared subsequent to a category-term association for RED and prior to a category-term association for BROWN. PURPLE and ORANGE, if acquired by a child, were the final category-term associations learned.)

Figure 3. Mean error frequencies as percentages of total responses across groups. (Percentage frequencies run along the vertical axis. Children as grouped by number of acquired basic color category-color term associations are indicated on the horizontal axis. Group 1 contains 13 children with zero to three acquired associations. Group 2 contains 19 children with four to six acquired associations. Group 3 contains 11 children with seven to nine acquired associations. Within the graph, dotted lines represent the frequencies for total errors (higher frequencies) and other errors. Full lines indicate random responses (closely paralleling total errors) and admissions of ignorance.)